California Strategic Fuel Reserve

Public Workshop April 24, 2003

California Energy Commission

Agenda

- Background
- General Issues
- Inventory Availability and Usage
- California Refinery Capacity Increase
- Forward Market
- Cost Benefit Analysis
- Summary

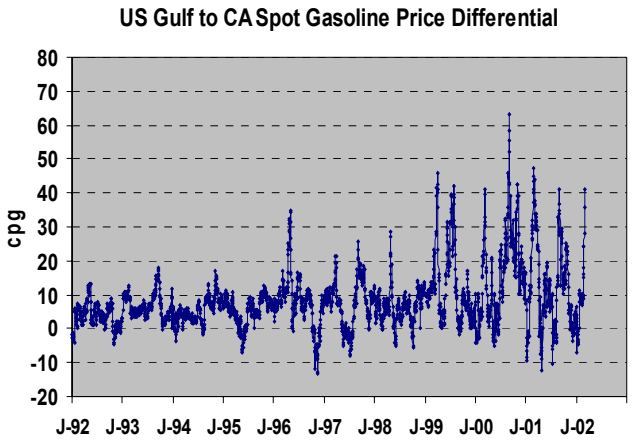
Background

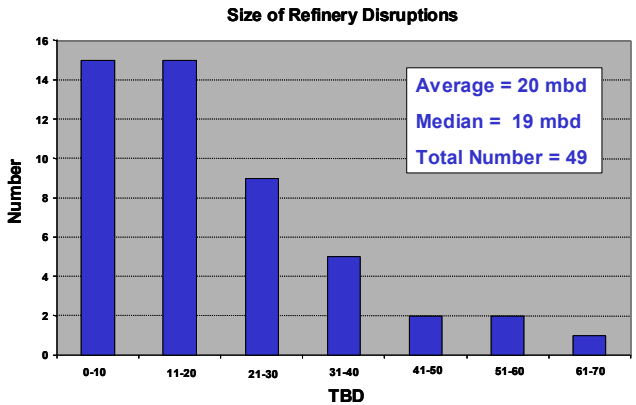
- SFR Study initiated in 2001 after AG investigated 1999 price volatility
- Stillwater conclusions presented March 2002, final report July 2002
  - Comprehensive market study
  - In depth analysis of other reserve initiatives
  - Identified physical and commercial barriers to supply
  - Proposed building of new storage under government guarantees for short term use
  - Proposed rolling inventory under forward time swap mechanism to facilitate imports
  - Showed order of magnitude difference between benefits and costs
- Further study required into several aspects of proposal

SFR Conclusions

- Barriers to supply exist due to distance, product specifications
- Refinery expansion has not kept pace with gasoline demand growth
- Product imports will supply most of the forecast demand increase
- The infrastructure required for imports is strained
- Imports are more likely to come from foreign refineries due to shortfall in US Flag shipping
- The lack of a forward market creates risk for importers
- Unocal's gasoline patents reduce gasoline supply
- Unplanned supply disruptions are likely to be more severe

What lead to proposal to do something



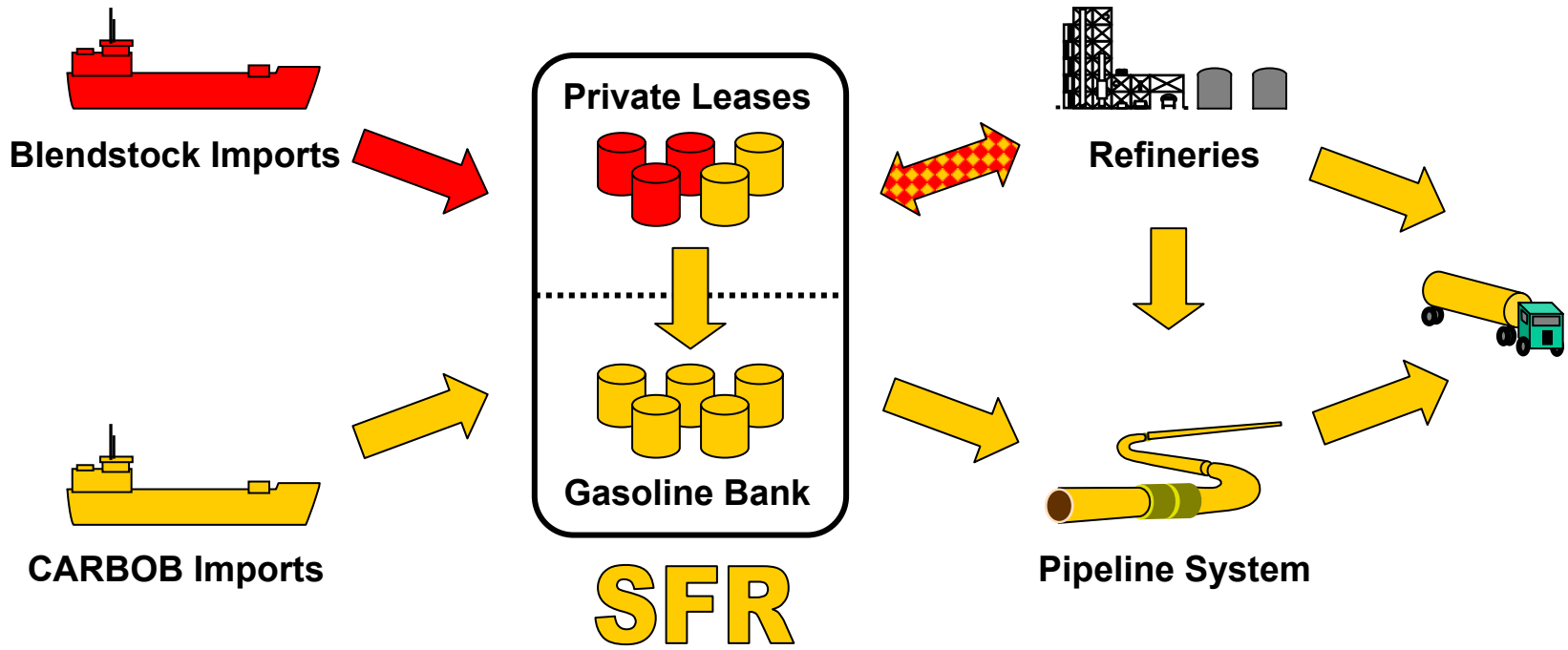


- Increasing volatility
  - Unique specifications
  - Geographical isolation
  - Physical and commercial barriers to entry
  - Significant risk of refinery disruptions
  - Highly inelastic price/demand behavior
- Criteria for solution
  - Use only new tankage
  - No stagnant supply overhang
  - Integrated in the refining centers
  - Open access
  - Mitigate physical and commercial risk for importers

SFR Recommendations

- Create fast track one-stop shopping permitting procedure for petroleum infrastructure projects similar to that for power projects
- State to issue a tender for the construction of 5 MM bbl of tankage
  - With deepwater access and connected to the distribution system
  - 3 MM bbl in LA, 2 MM bbl in the Bay Area
  - Half the volume to be subleased to market participants
- State to purchase 2.5 MM bbl of summer grade CARBOB for the Gasoline Bank
  - Tenders issued over time during winter season to prevent price spike
  - Qualified participants can withdraw and repay volumes for a fee
  - The fee to be determined by electronic auction
- Recommended to conduct next stage more detailed design of SFR first
  - Evaluate various operating alternatives and auction mechanisms
  - Design oversight functions

What was Proposed



Key Features

- Initial fill 2.5 MM bbl to be purchased as Phase III CARBOB gradually and over time so as to not upset the market
- Cost are estimated at $25 MM per year or 0.2 cpg, not including potential offsets for cost of initial fill under federal Energy Policy and Conservation Act or fees from auctions
- Conduct periodic or on demand electronic auctions for prompt lifting of product, with redelivery within six weeks
- Any qualified participant can participate
- Trading around the lifting rights and replenishment obligations will create a satellite market that will likely improve liquidity

Create *The Gasoline Bank of California*

Controversial Issues

- Government Interference
- Lack of detail in design
- Inventory availability and usage
- Marine infrastructure capabilities and access
- Capacity expansion of in-state refineries
- Development of forward markets by other means
- Cost/Benefit Analysis

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Government Interference

- Government has legitimate task to ensure competition and security of supply of key commodities
- Concept as proposed aims to minimize government role
  - Storage built and operated by private service sector on tenders
  - Auction function can also be tendered to private sector
  - Government role limited to oversight
  - Making inventories available to private industry and underwriting guarantees to build storage is similar to investment subsidies and stimulus packages
- Much of the criticism in this area was based on principle rather than against the actual proposal

Lack of Detail

- Charter for the Stillwater study was to conduct a general feasibility study into the cost and benefits of a reserve
- Study focused on barriers of supply and underlying causes for price volatility
- Concept of Gasoline Bank was born out of analysis of commercial and physical supply barriers and problems identified with traditional reserves
- Cost/benefit analysis showed consumer savings that were in the order of ten to twenty times greater than expenses ($200 - $500 MM vs. $15 - $25 MM cost)
- Recommendation was to expand conceptual early stage feasibility study into actual detailed design
  - Issue tenders for storage and auction function
  - Select best alternative for forward time swap mechanism
  - Design government oversight role

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Inventory Issues

- Arguments against SFR and state-sponsored private tankage
  - "Crowding Out" of private inventories: refiners would no longer maintain inventories because they know that they can borrow from the reserve
  - Existing tankage adequate, California has never run dry
  - Sponsoring facilities for independent importers is unfair to those deeply invested in the California market
  - Inventories in US as a whole not much better
  - Private industry will fill the need if there is one
- Of these arguments, only the latter was found to have merit
  - Significant additions have been announced
  - Some of the commercial barriers to building new tankage have been overcome
- Situation however remains critical
  - Storage still incredibly tight
  - All current additions make use of existing permits, no test for truly new tankage yet

Petroleum Storage in California[1]

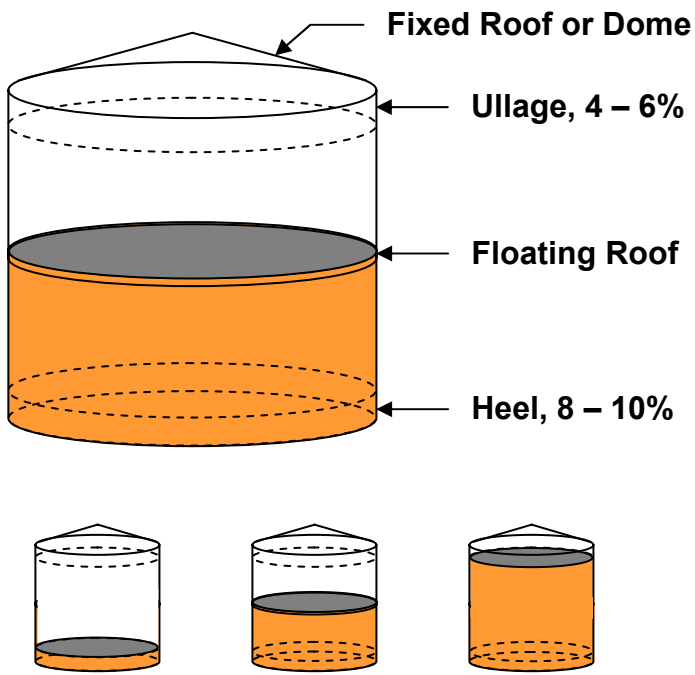
Stillwater Associates

	Large Refineries	Small Refineries	Bulk Terminals	Small Terminals[3]	Military Depots	End User Storage
Entities (#)	11	9	32	158	34	4,484
Storage Tanks (#)	1,637	510	811	1,663	281	19,426
Capacity (MM bbl)	103.8	7.0	38.0	39.9	3.3	4.3
Average Size (bbl/tank)	63,400	13,700	46,900	24,000	11,700	220
Crude Service[2] (MM bbl)	28	2	8	8	-	-
Process Tankage[2] (MM bbl)	26	2	-	14	-	-
Black Oil[2] (MM bbl)	18	2	6	-	-	-
Gasoline & Comp[2] (MM bbl)	24	NA	18	13	NA	3
Other Products[2] (MM bbl)	8	NA	6	4	NA	1

1) Source of Data: CA Water Board permit registry
2) Stillwater estimates based on various data sources
3) Small terminals include distribution terminals, truck racks, pipeline pump station tankage and crude oil production tankage

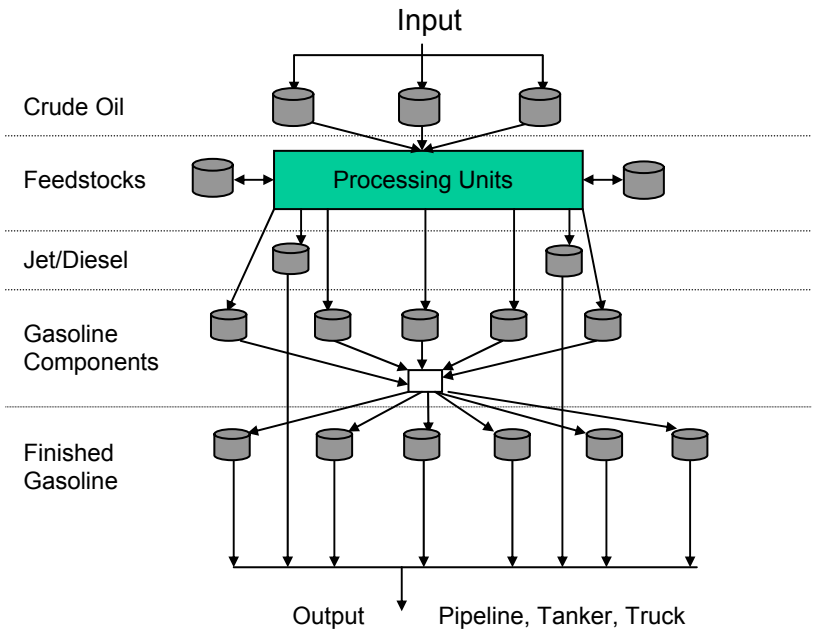
Basic Principles of Storage

Typical Gasoline Tank



- Gasoline tanks are usually equipped with floating roofs to limit vapor emissions
- Often tanks will also have a fixed roof or dome to keep out rainwater or for further emission control
- The floating roof needs to stay afloat at minimum liquid levels, causing 8 to 10% of the tank capacity to be trapped
- At the top, tank internals such as fire foam nozzles prevent the floating roof of going all the way up to the edge, resulting in 4 – 6% empty space
- As much as 15% of gross capacity may not be usable
- Modern “drain-dry” tank designs reduce these inefficiencies considerably

Basic Principles of Storage



Typical Refinery Tank Usage

- Refineries need to be able to segregate many different types of crude oil, intermediate products, blending components and finished products
- Typically, a barrel of gasoline may have seen at least 4 to 5 storage tanks before it leaves the refinery
- Overall, the need to produce and store many different grades of gasoline and diesel decreases the efficiency of tank usage
- The increasing complexity of California's gasoline specifications requires more blending components and makes final blends harder to make

A refinery can be short on CARBOB with most tanks half full

Refiner Inventory Management

- The Supply Department of a refiner is charged with inventory management
  - Planning, scheduling, trading functions
  - Crude, Products, and LPG
- Routinely work with the refinery to forecast production
  - Must keep refinery from overfilling
- Routinely work with their Marketing Dept. to forecast demand
  - Must meet demand and prevent stock-outs
- Buy/sell or exchange volumes to balance supply & demand
  - Buy when refinery production falls short of marketing demand
  - Sell when refinery production exceeds marketing demand
  - Exchanges are used for short term problems or supply of distant locations

Refiner Inventory Planning

- Refinery turnarounds are significant inventory planning events
  - Refinery production will be reduced for 2-5 weeks, depending on the type of maintenance required
  - Maintenance work can impact all or some of the production
- The Supply Dept. must determine how to meet Marketing Dept. sales forecasts
- Increase inventory in owned or leased tankage before the turnaround starts by
  - Increasing imports or purchases from other local refiners
  - Decreasing discretionary sales
- Increase supply during the turnaround via the same means
  - Build in a cushion of supply in case the turnaround goes long

Basic Principles of Storage

- Operational tanks
  - Batched tanks: continuously cycle between full and empty (production rundown tanks, pipeline tanks)
  - Process Buffer tanks: compensate for process upsets and ideally are kept at 50 to 60% inventory to provide room for both upside and downside swings
  - Shipping tanks: cycle full to empty depends on delivery/receipt volumes

⇨ **Expected inventory behavior: Narrow fluctuations between 50 and 60% (heel + 50% of range; average total inventory for a large number of tanks that cycle randomly between full and empty)**

- Strategic Storage
  - Build up of inventories for planned outages

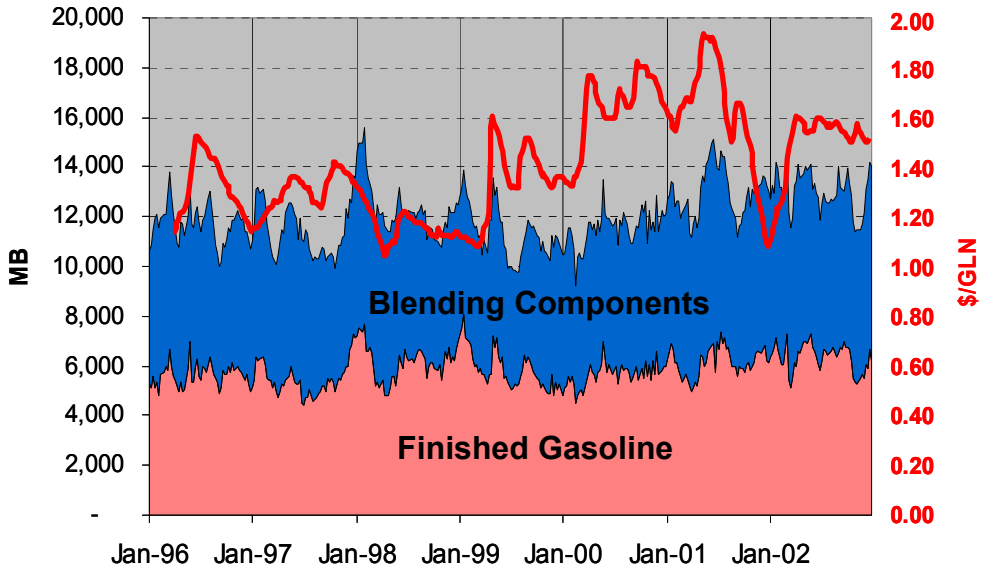
⇨ **Expected inventory behavior: build-up in Q4, draw down in Q1**

  - Maintaining inventory in anticipation of market movements

⇨ **Expected inventory behavior: build-up when prices expected to go up, draw down when prices are high**

Observed Inventory Behavior

CA Refinery[1] Inventories of Gasoline & Blendstocks vs. Retail Price of Regular Gasoline



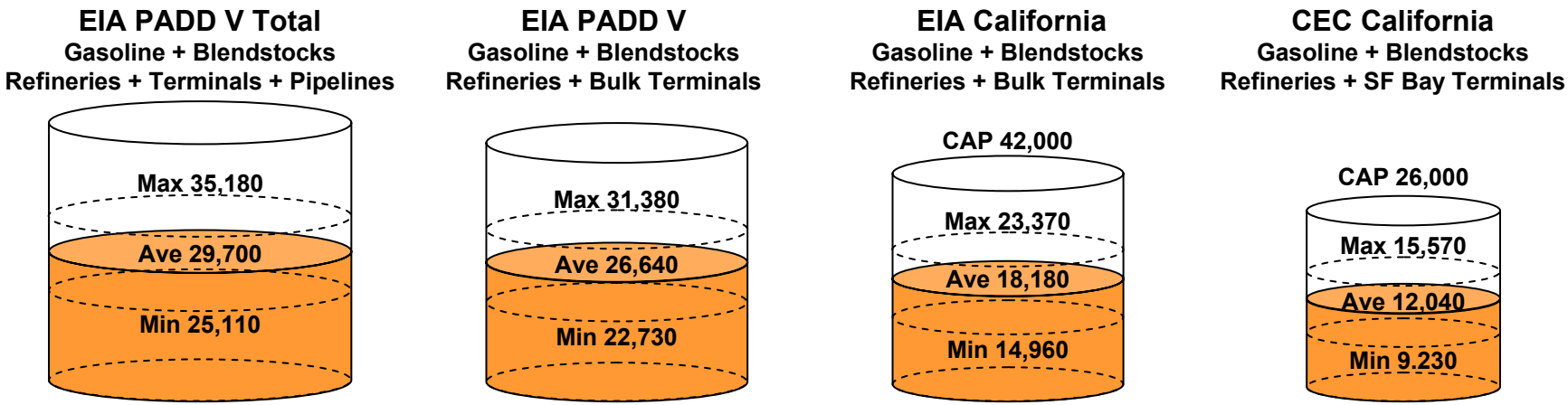
1) CEC Data; Also includes inventories held in Bay Area bulk liquid terminals

- Some evidence of strategic stock building to cover turnarounds in Q4 1997, Q4 1998
- No evidence of stock retention until prices spike
  - Q4 1996, Q1 1997 stocks down before price went up
  - Q2 1997 stocks up while price up
  - Q4 1998 stocks up while price still high
  - 1999 outages caused high prices at low inventories
  - 2000 prices stayed high, no stock movements
  - 2001 stock build while prices still high, sold during price drop
  - 2002 prices recover while inventories stay high
- Inventories move randomly in a narrow band around 50%, consistent with operational considerations

Refinery inventories are largely operational

Reconciliation of Reported Gasoline Inventory Numbers

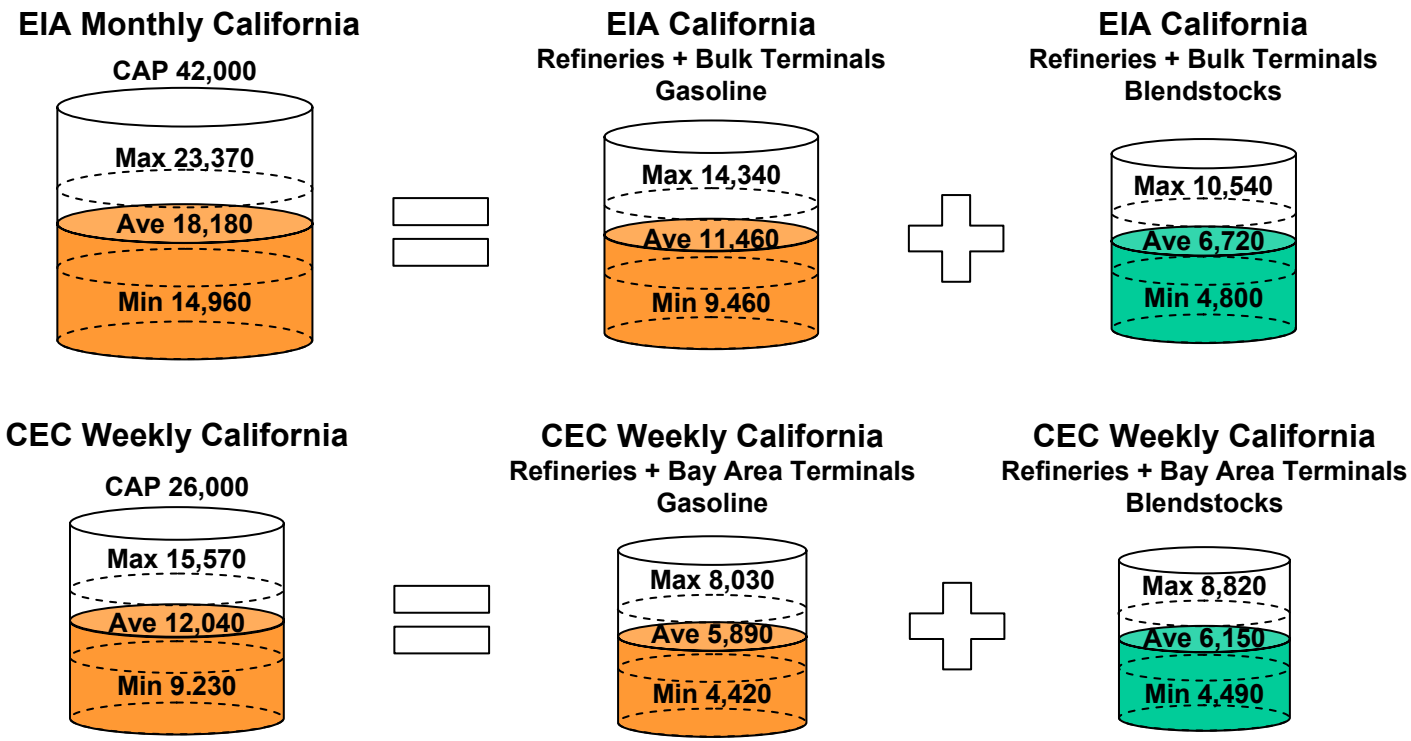
Stillwater Associates



Reported Gasoline + Blendstock Inventory Ranges in MB over the Period 1996 – 2002

- EIA reports monthly PADD V inventories by grade for Refineries, Bulk Terminals and Pipelines
- EIA reports monthly CA inventories by grade for Refineries, Bulk terminals and Pipelines
- CEC reports on a weekly basis inventories for CA refineries + Bay Area bulk terminals
- Total EIA reported CA bulk inventories match with weekly CEC numbers when scaling up for total tank capacity, 26 MM bbl for CEC versus 42 MM bbl for EIA reported tankage

Breakdown of Gasoline Inventories



Reported Gasoline + Blendstock Inventory Ranges in MB over the Period 1996 – 2002

Most of the blendstock inventories are at refineries

CA Gasoline Inventories vs. US

Finished Gasoline at Refineries & Terminals (Net of Pipeline Volumes)
Minimum, Maximum and Average Values of EIA weekly data 1996 - 2002

	Min MM bbl	Ave MM bbl	Max MM bbl	Min Days	Ave Days	Max Days
California[1]	9.5	11.5	14.3	9.5	11.5	14.3
US total	103.8	117.8	134.1	12.8	14.5	16.6
US - California	94.3	106.3	119.8	13.3	15.0	16.9

1) Includes inventories of all grades and formulations of gasoline

- Inventories of gasoline in the US have dropped while supply has increased: stocks now 13 to 17 days versus 25+ in mid eighties
- Gasoline storage in the US as a whole is now also tight, but still substantially better than California: on average 3 days of supply (30%) more than CA
- Rest of US has more robust infrastructure to deal with refinery disruptions: vast pipeline network, shorter import routes, fungible product specifications

California inventories should be higher, not lower than US

California Storage Market Recent Changes

- 1999 through 2002 shortage of clean product tanks for spot rental
  - Refiners had stopped renting out tanks to 3rd parties in their proprietary terminals
  - Storage companies were bought out by Master Limited Partnerships (MLPs) who enjoy preferential tax treatment but need "qualified income" under long term contracts with major companies
  - Commercial tankage increasingly booked up under long term agreements with refiners
  - Independent importers were unable to land cargoes in LA
- Recent changes
  - Trading companies are willing to sign term contracts (i.e., 3 years)
  - MLPs are willing to build new tankage for traders at those terms
  - Some high cost tankage brought back into service for ethanol

Product Storage Capacity Additions

Capacity	Product*	Location	By	For	Status	Complete
300,000	Clean	SF Bay	Terminal Co	Trading Co	Under existing permit	2003
200,000	Clean	LA	Terminal Co	Refiner	Under existing permit	2003
50,000	Clean	LA	Trading Co	Self	Permit June 2003	2003
600,000	Clean	LA	Refiner	Various	Upgrade of older tankage	2003
240,000	Clean	LA	Refiner	Self	Upgrade of older tankage	2004
500,000	TBD	LA	Small Refiner	Various	Upgrade of older tankage	2004 (?)
TBD	Clean	LA	Terminal Co	Trading Co	New construction	2007 (?)
2,000,000	Crude	LA	Terminal Co	Various	New construction	2007 (?)
TBD	Clean	LA	Terminal Co	Various	New construction	2008 (?)

*** Clean products include gasoline, blending components, ethanol, jet, diesel**

Clean Products: 1.4 MM bbl firm additions + 1.1 MM bbl potential

Crowding Out

- Discretionary inventories are stocks held above operational requirements
- Crowding out applies to discretionary inventories
- Operational inventories will not be impacted by crowding out
- Estimate of discretionary inventories is 0.5 MM bbl, 15 to 20% of the operating range
- Even if all current discretionary inventory is crowded out, it still results in 2 MM bbl net, a four-fold increase
- The 0.5 MM bbl displaced discretionary inventory is in tankage that given the tight overall storage is going to be used for operational purposes

California Gasoline Inventories – Summary

- Total CA bulk inventories of gasoline and blendstocks move in a narrow band around 50% of capacity, ranging from 15 to 25 MM bbl in 42 MM bbl tankage
- Total finished gasoline inventories at refineries and bulk terminals are between 10 and 14 days of consumption, versus 13 to 17 days for the US as a whole
- The minimum of around 10 MM bbl is what it takes to keep the system wet (even at times of acute shortage inventories never fell below this level)
- The effective finished gasoline operating range is 4 to 5 days of consumption
- LA Refiners are on record testifying to extreme shortage of tankage in Dec 2001 SCAQMD hearings
- Clean product tank rental rates are at historic high, industry initiatives to add new or reactivate idle tankage amount to 1.4 MM bbl
- The argument for “crowding out” private inventories is not credible
- There is significant exposure for the State in terms of supply security in addition to price volatility

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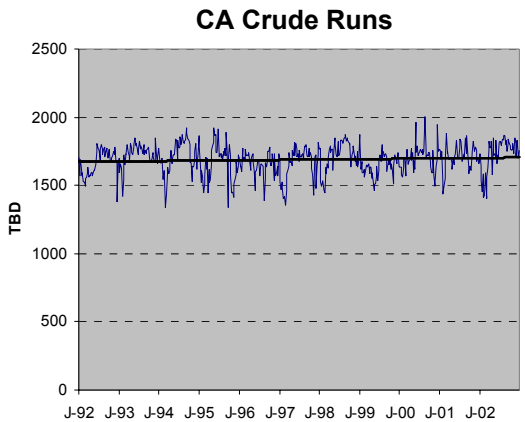
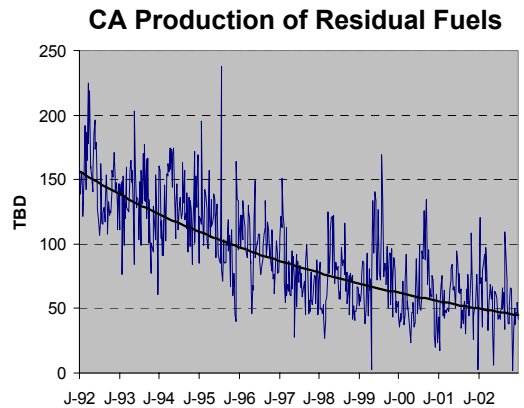
Refinery Capacity

- In-state capacity is the preferred mode of supply, should be lower cost than imports
- Over past decade, demand growth has outstripped capacity additions
- Increase in capacity can be achieved through
  - Discrete projects
  - Small improvements in operating procedures (capacity creep)
- Obstacles to capacity increase
  - Title V Operating Permits often have rate restrictions
  - Even a small increase in one area may require re-permitting of the entire refinery
  - Diminishing returns when reaching the end of the learning curve
  - Capital cost in uncertain industry environment

California Refineries Capacity Increase





- Reported production of gasoline includes imports of blending components by refiners
- Real increase in production capacity must be evaluated from
  - Increase in crude runs
  - Increase in conversion
- Increase in crude runs over 1992 through 2002 was 0.3% per year, or 63 TBD total
- Increase in conversion = decrease in production of residual fuel, was 96 TBD
- Estimated increase in gasoline production from 1992 to 2002 is 50% of increase in runs + conversion, or 80 TBD
- Effective capacity creep is 0.6%
- Fast approaching bottom of the barrel

California Refinery – Capital Projects

- Recent track record for refinery expansion projects in CA
  - Tesoro conversion of 20 TBD conventional gasoline was a condition of the refinery purchase
  - Valero Wilmington had to abandon project in face of opposition from NGO's
  - CENCO failed to raise financing, could not overcome local interest litigation
- ConocoPhillips new FCC/alkylation plant at Ferndale, WA should provide additional supply for California
- Tesoro adds to CARB capability in WA
- Global refiners (BP, ConocoPhillips, ExxonMobil, Shell, ChevronTexaco) will evaluate all options including increased imports from within their systems

California Refinery Capacity – Summary

- Potential for capacity creep is limited
  - Approaching bottom of the barrel
  - Operating permit constraints
- Capital projects for major expansions
  - Unlikely to make economic sense for integrated global majors
  - Well organized opposition from special interest groups

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Importance of Forward Market Liquidity

- Supply chain for imports is long, typically at least 4 weeks
- The risk specific to the California market cannot be adequately hedged (how long will the price spike last?)
- The absence of risk reduction tools means that rewards have to be bigger to attract supplies
  - Decisions to import are delayed
  - Price spike has to be significant
- Importance of hedging price risk is greater for independent importers than for integrated refiners

Principle of Hedging

- In a forward trade, a buyer and seller agree on a future delivery date at a certain price
- Both buyer and seller incur risk that the price fixed now for future delivery will be out of line with the then prevailing market price
- The risk can be offset by doing a parallel but opposite paper trade in a commodity that exhibits the same price behavior
- A central clearing house collects all paper trades
- Overall, buy and sell risks of paper trades will cancel out to a large degree
- Paper trades become instruments for knowledge based trading in a Futures Market
- At the heart of the paper market still lies the physical delivery

Requirements for Forward and Futures Markets

- A Futures Market requires a large number of transactions against standardized terms (Liquidity)
  - Required to achieve offsetting risks
  - Required to spread overheads and minimize cost of hedging
- Liquidity requires
  - A large number of market participants
  - Diversity of market participants
  - A physical trading hub
- Standardized terms require
  - Readily fungible product specifications
  - Well defined delivery terms in physical hubs where there is little or no risk that products cannot be delivered, against standardized handling cost

Creating Forward Liquidity in CA Gasoline Market

- Major obstacles to liquidity
  - CARBOB is not readily fungible – unique specifications, difficult to make
  - Physical delivery hub with standardized terms – difficult to land product in LA Basin
  - Diversity of market participants – handful of traders and local refiners
- Chicken & Egg conundrum:
  - Without liquidity in a physical forward market, a paper derivatives market is not possible
  - Without paper derivative hedging tools, forward deals too risky for many participants
- Forward and Futures Markets are means to an end, not a goal in itself
- Physical forward volume swap is an alternative means to do forward deals with known costs
- No aggregation of forward buyers (“natural longs”)

Current Status of CA Forward/Futures Market

- Current forward market is illiquid: many days no trades, highly traded days 4 to 5 deals
- NYMEX does not provide futures contracts for California gasoline
- Outlook for creating more liquidity on its own
  - Slow process
  - May evolve when rest of world catches up with California in gasoline quality
  - No current means to bridge the time/distance factor

Forward time swap mechanism is alternative route to liquidity

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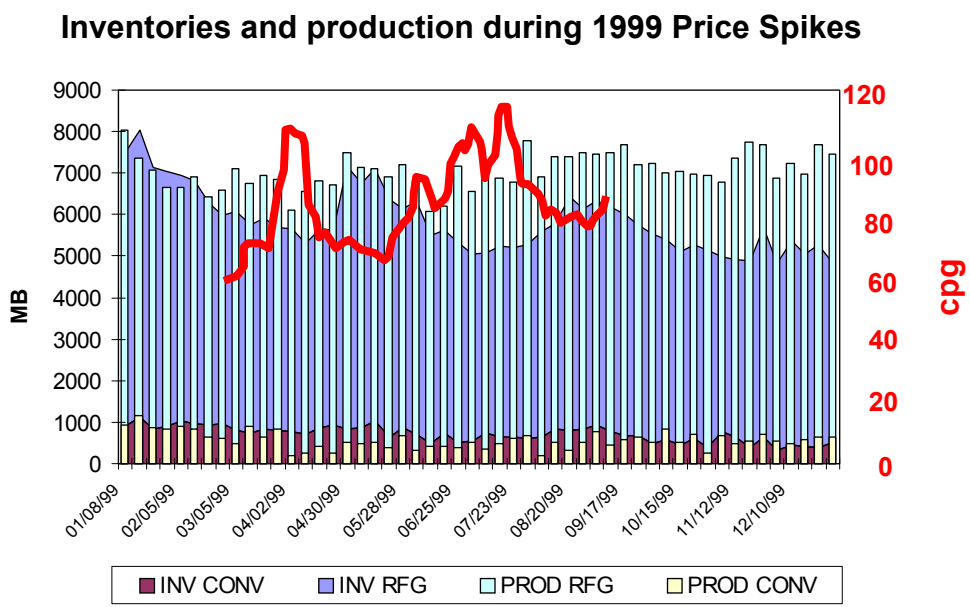
Cost Benefit Analysis

- Cost for the SFR were based on
  - Tender of storage contract with major service providers at prevailing market rates for newly built tankage
  - Debt service cost for initial fill
  - Administrative cost
  - Total annual cost $25 million, potentially as low as $15 million if partially funded with offsets under EPCA and auction fees
- Consumer Benefits
  - Derived from statistical analysis of past 6 years price spike history
  - Based on cutting off tops of worst spikes because imports would start flowing immediately rather than after initial delay
  - Savings to consumers were evaluated in order of $250 million and more
- Controversial Issues
  - “Hundred Year Storm”
  - Federal offsets

Hundred Year Storm



- 1999 was year with exceptional outages, the equivalent of the 100 year storm (so we hope)
- Confusion arose over use of 1999 price spike to test adequacy of proposed reserves
- To test physical adequacy, 100 year storm is most severe case
- Consumer benefit calculations were based on a statistical evaluation of 6 year's worth of data
- Cases were run that excluded 1999 and still showed consumer benefits far outweighing cost

Benefit Analysis

- Based on detailed statistical analysis of refinery disruptions by Dr Tony Finizza
- Base case benefits $0.4 BN per year based on historical average capacity loss and duration, $1.50/gln gas, - 0.15 price elasticity, 10 cpg cost to replenish SFR
- Benefits were calculated for a wide range of scenarios
  - Price elasticities - 0.10 and - 0.20
  - Starting retail price $1.00 to $2.00
  - Excluding 1999 disruptions
  - Replenishing costs 5 cpg to 15 cpg
- Benefits range from low case of $169 MM/year to high of $600

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Summary – Unchanged Conclusions from 2002

- Insular market with non-fungible product
- Local industry not able to keep up with demand growth
- Physical and commercial barriers to entry
- Imports need to double by 2010
- Import infrastructure limited
- Industry inventories critically low
- Highly inelastic demand
- Refinery disruptions create severe price spikes
- Gasoline Bank concept savings to consumers far outweigh cost

New Insights

- Storage project activity in LA Basin has increased significantly in recent months
  - One terminal (owned by refiner) is rebuilding idled tankage previously deemed too expensive by the market
  - Trading companies have committed to term agreements
  - MLPs are building new tankage under short term agreements
- Marine Infrastructure bottlenecks
  - SF Bay dredging issue
  - SF Bay gathering system
  - LA Basin dock usage
  - LA Basin limitations to move product inland
  - Key elements of crude oil infrastructure vulnerable
- Refinery reliability has held up well in 2002 (although March 2003 supply issues created a large price spike)

Recommendations

- Proceed to next step for SFR
  - Evaluate various operating alternatives and auction mechanisms
  - Design oversight functions
  - Issue tenders and confirm costs
- Shift focus to support for announced projects
  - SF Bay dredging
  - Various storage and pipeline projects in both refining centers
- State to increase market transparency
  - Improve monitoring, data collection and reporting systems
  - Track infrastructure project progress
  - Analyze price spikes and root causes